

Remarks:

Reconsideration of the application is requested.

Claims 1-17 remain in the application. Claim 1 has been amended. Claims 14-17 have been withdrawn from consideration at this time.

In the section entitled "Claim Rejections - 35 USC § 102" on pages 2-4 of the above-mentioned Office action, claims 1-7, 9, and 11-13 have been rejected as being anticipated by Noble et al. (US Pat. No. 5,973,356) under 35 U.S.C. § 102(b); claims 1-7 and 11-12 have been rejected as being anticipated by Bertin et al. (US Pat. No. 5,468,663) under 35 U.S.C. § 102(b).

The rejections have been noted and claim 1 has been amended in an effort to even more clearly define the invention of the instant application. Support for the changes is found on page 13, lines 1-5 and page 20, 2-9 of the specification.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 calls for, inter alia:

a control layer trench formed in said charge storage layer and defined by walls, said charge storage layer surrounding said control layer trench;

a control layer formed essentially on said surface of said second dielectric layer, said control layer including a control filler layer formed in said remaining part of said control layer trench and a control gate layer located on said surface of said substrate;

a filler material for at least partially filling said trench extension, said filler material separated from said control filler layer. (Emphasis added.)

According to the invention of the instant application, the control layer trenches (5'') constitute depressions in the form of round or oval holes as fabricated in DRAM processes for the trench capacitors (see Fig. 6 and the corresponding description). Therefore, at least the charge storage layer (9) on the right and left side of the sectional views of the figures are connected with each other and refer to the same memory cell. In contrast, in the cited prior art references, these layers are separated from each other and refer to different memory cells. Thus, the function of the trench extension according to the invention of the instant application is also different from the prior art trench extension.

In addition, neither Noble et al. nor Bertin et al. disclose that the control layer includes a control filler layer formed in a remaining part of the control layer trench and a control gate layer located on the surface of the substrate, and that

the filler material is separated from the control filler layer.

Clearly, neither Noble et al. nor Bertin et al. show "a control layer trench formed in said charge storage layer and defined by walls, said charge storage layer surrounding said control layer trench; a control layer formed essentially on said surface of said second dielectric layer, said control layer including a control filler layer formed in said remaining part of said control layer trench and a control gate layer located on said surface of said substrate; a filler material for at least partially filling said trench extension, said filler material separated from said control filler layer", as recited in claim 1 of the instant application.

Claim 1 is, therefore, believed to be patentable over the art and since claims 2-7, 9 and 11-13 are dependent on claim 1, they are believed to be patentable as well.

In the section entitled "Claim Rejections - 35 USC § 103" on pages 4-5 of the above-mentioned Office action, claim 8 has been rejected as being unpatentable over Noble et al. or Bertin et al. in view of Hong et al. (US Pat. No. 5,457,061) under 35 U.S.C. § 103(a): claim 10 has been rejected as being unpatentable over Noble et al. or Bertin et al. in view of Gregor et al. (US Pat. No. 6,008,091) under 35 U.S.C. §

103(a); claim 13 has been rejected as being unpatentable over Bertin et al. in view of Bergendahl et al. (US Pat. No. 5,399,516) under 35 U.S.C. § 103(a).

As discussed above, claim 1 is believed to be patentable over the art. Since claims 8 and 10 are ultimately dependent on claim 1, they are believed to be patentable as well.


In view of the foregoing, reconsideration and allowance of claims 1-13 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate a telephone call so that, if possible, patentable language can be worked out. In the alternative, the entry of the amendment is requested as it is believed to place the application in better condition for appeal, without requiring extension of the field of search.

If an extension of time for this paper is required, petition for extension is herewith made. Please charge any fees which might be due with respect to Sections 1.16 and 1.17 to the

Deposit Account of Lerner and Greenberg, P.A., No. 12-1099.

Respectfully submitted,



LAURENCE A. GREENBERG
REG. NO. 29,308

For Applicant

YHC:cgm

April 28, 2003

Lerner and Greenberg, P.A.
Post Office Box 2480
Hollywood, FL 33022-2480
Tel: (954) 925-1100
Fax: (954) 925-1101

Applic. No.: 09/940,001

Marked-Up Version of the Amended Claims:

Claim 1 (twice amended). A vertical non-volatile semiconductor memory cell, comprising:

a substrate having a surface, a drain region, a channel region and a source region;

a trench formed in said substrate from said source region to said drain region, said trench formed vertically, essentially perpendicular to said surface of said substrate, said trench having trench walls;

a first dielectric layer formed essentially on said trench walls;

a charge storage layer for storing charges, said charge storage layer being formed on said first dielectric layer;

a control layer trench formed in said charge storage layer and defined by walls, said charge storage layer surrounding said control layer trench;

a second dielectric layer formed at least partially on said walls of said control layer trench and having a surface, said

second dielectric layer defining a remaining part of said control layer trench;

a control layer formed essentially on said surface of said second dielectric layer, said control layer including a control filler layer formed in said remaining part of said control layer trench and a control gate layer located on said surface of said substrate;

a trench extension formed essentially underneath said trench, said trench extension having a surface;

a third dielectric layer formed on said surface of said trench extension; and

a filler material for at least partially filling said trench extension, said filler material separated from said control filler layer.